REMARKS

Claims 1-16, all the claims pending in the application, stand rejected. The earlier allowability of claims 14-16 has been withdrawn in light of newly cited prior art.

Claim Rejections - 35 U.S.C. § 103

Claims 1-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Maher et al (6,647,020). This rejection is traversed for at least the following reasons.

The Examiner looks to the newly cited patent to Maher et al for a teaching in Fig. 1 of a **plurality of terminals** (148, 150, 152, 154, 156), one of which is a master terminal. The Examiner asserts that each terminal is associated with a particular site and **local routers** 108 and 110 for supporting multicast services. The Examiner asserts that the Zone controller 116 acts as the claimed "**route server**" and is in communication with the plurality of the local routers. Finally, the Examiner asserts that the Zone controller is for (1) establishing IP multicast and (2) maintaining and dynamically assigning multicast control addresses to control message transmission between participating multicast groups, i.e. in a Zone (col. 8, lines 28-60).

Of particular importance to the Examiner's analysis is the response by the Zone controller 116 to a multicast request from a mobile terminal. Specifically, the controller returns a "Call Grant Message" to the base site 102 or any other participating sites, as taught at col. 9, lines 1-16. Further, the base site can operate in TDMA slots for allocating broadcast bursts to the mobile terminals, as taught at col. 4, lines 20-48.

The Examiner admits that Maher et al fails to teach that the network 100 in Fig. 1 includes mesh TDMA satellites. However, the Examiner asserts that one of ordinary skill would be motivated to incorporate a mesh satellite connection into the network of Fig. 1 in order to expand coverage.

The Present Invention

As previously explained in earlier amendments, the present invention concerns the provision of internet protocol (IP) multicast services on mesh satellite networks, of the type

illustrated in Fig. 1 of the application. In particular, the invention is focused on avoiding the incorporation in each terminal of the needed support for multicast IP routing in a mesh satellite network. The invention avoids the need for each terminal having a router to periodically communicate with all the terminal/routers in the mesh, thereby using satellite bandwidth, as well as significant CPU and memory resources.

The present invention uses a centralized route server to run the multicast routing protocols, thereby avoiding the need to use bandwidth for routing information about multicast IP traffic over meshed satellite networks. The importance of this feature, particularly in a mesh TDMA network, is explained at page 7, line 8, where it is emphasized that:

> ...as shown in Fig. 4, the present invention allows for a reduction in the number of slots required for routing information updates (i.e., to slots 1 and 5). This reduction occurs due to the fact that the routing information is exchanged only between each router and the RS 40 [route server] and not between all routers.

Fig. 1 illustrates a connection of satellite TDMA terminals through multicast enabled routers, External routers establish multicast routing sessions only with a route-server, and not with the other terminals. Thus, multicast routing packets (not communication packets) originated by an external router attached to a terminal are conveyed transparently to the common route server. The route server creates and stores multicast group table information for all routers. The single route server then provides that information to the terminals so that multicast traffic can be directly transmitted from the ingress terminal to all the terminals in a group, without having to be relayed through the route server.

As illustrated in Fig. 1, the route server 40 is disposed at a master terminal 32 and is connected to a network control center 30, which communicates with the satellite 12 via the master terminal. Other terminals 16, 34; 18, 36 at separate ISPs are connected to various routers (52, 54, 58) for access to external equipment. As illustrated in Fig. 2, a master routing table is established in the RS 40 by communication among the RS and other routers 52, 54, 56, 58.

Unlike the prior art arrangement of Fig. 3, the invention permits a reduction in the number of slots required for routing information updates, as illustrated in Fig. 4. This reduction occurs because the routing information is exchanged only between each router and the route server 40, and not among all routers. This fundamental feature of the present invention is recited in the rejected claims, particularly claim 1.

In claim 1, the system is defined as a mesh satellite TDMA network. The system has a plurality of terminals for providing IP multicast services as well as (1) a route server for establishing and maintaining routing information for a plurality of routers and (2) a controller operative to allocate broadcast burst to the terminals based on requests from the terminals via said route server. The requirement for the allocation of broadcast bursts based on requests from terminals "via said route server" is significant because it emphasizes the distinctive feature of the invention that information for such transmissions is exchanged only between external routers and the route server, and not among the external routers directly, as disclosed at page 7 of the present application.

Prior Art

In the Examiner's analysis supporting his rejection of claims 1-16, the Examiner looks to Maher et al, particularly Fig. 1, for an illustration of a plurality of terminals each connected to a router, and a route server. The flaw in this part of the Examiner's analysis is that there is no "route server" in Maher et al, having the capability as claimed. All of the routers will exchange routing information in the same manner as in the conventional art.

The Examiner looks to the Zone controller 116 as the route server. However, this is simply a conventional server that controls a conventional router 114 serving as a core router and is not a source of route information for distribution to all routers in the network. The function of the Zone controller 116 is explained at col. 4, line 5 with respect to the IP multicast communication system (or "network") 100 in Fig. 1. The system comprises a plurality of sites 102, 104, 106 that are coupled, via respective routers 108, 110, 112 to a core router 114. The routers 108-114 are conventional off the shelf routers, for example, 3Com "NetBuilder" series

routers. The core router 114 is coupled to a zone controller 116 having a processor 118 (such as a microprocessor, microcontroller, digital signal processor or combination of such devices) and a memory 120 (such as volatile or non-volatile digital storage devices or combination of such devices).

In one embodiment of the present invention, the Zone controller 116 manages and dynamically assigns IP multicast addresses for payload (voice, data, video, etc.) and control messages between and among the various sites 102, 104, 106. The multicast group addresses are identified and assigned on a call-by-call basis by the Zone controller 116. However, the routing pertaining to the IP multicast addresses are maintained by the routers 108-114 forming the network 100 (see col. 5, line 66 - col. 6, line 26). This distributed routing information based on the conventional "spanning tree" that is adopted by the reference, defines all of the router interfaces which contains group members and the necessary routes for providing the multicast capability. Thus, the Zone controller 116 does not retain tables of routing information for the entire router network in lieu of each router maintaining and managing its own routing information on the basis of exchanges with other routers.

An example of Zone controller 116 not being a route server is provided at col. 7, lines 29-46, where it is stated:

> For example, consider the case of the console(s) 138, 140 (FIG. 1) desiring to affiliate with talkgroups "A" and "B." The console(s) 138, 140 determine the IP address of the zone controller 116 through a well-known discovery protocol, then send affiliation requests for talkgroups "A" and "B" to the zone controller 116. The zone controller 116 returns affiliation ACK messages identifying control multicast group addresses associated with talkgroups "A" and "B." <u>The consoles 138, 140 send IGMP "Join" messages for the identified control multicast group addresses associated with talkgroups "A" and "B" to their associated router 112 which, in turn sends a PIM-SM "Join" message to the core router 114, thereby setting up branch 160 of the spanning tree of router interfaces</u>. As long as the

consoles 138, 140 remain affiliated with talkgroups "A" and "B," they will receive control messages addressed to the control multicast group addresses associated with those talkgroups.

Clearly, this description is of a direct communication between routers and not via a route controller as in the present invention.

Finally as to the Examiner's dismissal of the limitation to a mesh TDMA satellite network, the advantages of the invention are particularly noteworthy in that environment. The casual and brief mention of TDMA slots as a "suitable wireless communication medium" does not support a conclusion that the arrangement recited in the claims would be obvious. The environment expressly stated in the claims provides the unique advantages and economies that are disclosed for the invention in the present application. These advantages are unique to TDMA as the economies are emphasized by savings in TDMA slot usage for overhead purposes. Had the invention been appreciated by Maher, an emphasis on mesh satellite TDMA would have been provided. The silence of the reference in this regard demonstrates that the use of a router controller as claimed was never considered by Maher nor would it be obvious over Maher.

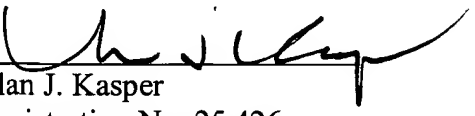
As to the dependent claims 2-13, the Examiner's analysis does not remedy the basic defect in the teachings of the two main prior art references.

Similarly, the features of method claims 14-16, that were previously considered patentable, are consistent with the foregoing arguments and would support patentability of these claims as well.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: June 30, 2004